Governing conflicts over sustainability: agricultural biotechnology in Europe

Book Section

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Governing Conflicts over Sustainability: Agricultural Biotechnology in Europe

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INTRODUCTION

Both 'governance' and 'sustainable development' have become key terms in policy debates. These terms have particular salience to techno-scientific controversies in Europe, where protest has challenged the legitimacy of regulatory procedures and innovation priorities. In the case of genetically modified (GM) crops, for example, critics have counterposed 'sustainable agriculture', while agbiotech companies have appropriated the same term to promote their own products. As this chapter will argue, divergent views of sustainability underlie the conflicts over biotechnological innovation and regulation. Governments have extended regulatory procedures and public consultation, sometimes in the name of 'governance', which denotes broader forms of conflict management. The chapter draws upon a case study of European efforts to govern conflicts over GM crops as a sustainability issue. A focus on the late 1990s provides a snapshot of longer-term policy changes still underway.

ANALYTICAL CONCEPTS

Prior to the case study, it is necessary to examine the two policy terms – 'sustainable development' and 'governance' – as analytical concepts.

Sustainable development

'Sustainable development' has become a central concept for public debate and government policy. Since the term was popularised by the Brundtland (1987) report, its meanings have become more diverse and contested. Sustainable development has been widely promoted as a means to achieve environmental sustainability (Dobson 1996). Often the environmental aspect has been distinguished from social and economic sustainability. Yet such distinctions can be misleading because all three aspects are linked within any view of sustainability. Fundamentally at issue is how resources should be conceptualized, valued, managed, preserved or consumed – to sustain what kind of society, economy and environment?

Social science has devised various ways to classify views of sustainability. A relational model is necessary for policy analysis – that is, for analysing how various political forces seek allies, undermine opponents and thus attempt to influence policy. For that analytical purpose, Woodhouse (2000) classified divergent views of sustainability as a three-part taxonomy — neoliberal, people-centred, and an environmental management which mediates conflicts between the other two.

In brief, the three views can be summarised as follows (see Table 1):

- Neoliberal (or market-driven): develop eco-efficient technologies and 'green' products to exploit natural capital in ways compatible with the market system, thus enhancing economic competitiveness and environmental protection at the same time (e.g. Schmidheiny 1992).
- People-centred (or community): devise rules to protect common goods from over-exploitation, as a basis for communities to link producers with consumers, thus resisting industrialization and economic integration into global commerce (e.g. Sachs 2003).
- Environmental management: enhance the carrying capacity of future ecosystems through technological advance, social re-organization, negotiated rules for resource usage, performance standards, etc.; regulate cultivation methods so that they do not undermine agricultural resources (e.g. Brundtland 1987; CEC 2001).

From the above taxonomic perspective, it can be asked: In the case of GM crops, how do the conflicts relate to divergent views of sustainability? What changes occur in regulatory criteria? And why?

Table 1: Divergent Views of Sustainable Development

View	**Neoliberal (or marketization)**	**Environmental management**	**Community (or people-centred)**
Led by	multinational companies	government agencies	small-scale producers
Problem-definition	inefficiency, depletion of environmental capital	envt/development falsely separated; global interactions	undemocratic institutions; profit-driven innovation
Concept of nature	capital to be invested; assets providing environmental services	eco-support system, human habitat	harmonious balance and/or commons to be shared
Sustain what?	natural capital, substitutable by human capital	optimum resource usage	communities as guardians & beneficiaries of commons
Economic aims	compete better in market for green commodities	economic growth through socio-technical re-organization to increase carrying capacity	enhance livelihoods of small-scale producers
Solution	eco-efficiency to reduce pollution & reap cornucopia	negotiated rules and standards; international cooperation	link producers with consumers
Expertise	R&D for clean products	interdisciplinary networks to model and predict environmental effects	know & work with nature; use local resources

Governance

In the political science literature, governance is often understood as co-operative means to deal with common problems and conflicts. For example, governance involves social institutions 'capable of resolving conflicts, facilitating cooperation, or, more generally, alleviating collective-action problems in a world of interdependent actors' (Young 1994: 15). Similarly, governance has been described as 'a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken' (CGG 1996: 2).

Why has the term ‘governance’ become so prominent in the past decade or so? Although it can simply describe efforts at broader inclusion or participation, the term has more specific origins and meanings. Often governments have invoked international legal and economic imperatives such as ‘free trade’, especially to over-ride national procedures and sovereignty. As a classic example, global trade rules have been designed to promote regulatory harmonization for trade liberalization. The consequent rules ‘effectively narrow the menu of regulatory choices open to governments’ (Newell 2003: 61, 64). More generally, constraints on government are reproduced through ‘a discourse of technical-rational knowledge’ – that is, by representing all problems as amenable to technical solutions (Ford 2003: 124-125).

Such rhetorical-technocratic imperatives have often backfired, especially by provoking strong protest. This has led governments or international bodies to develop more participatory forms of governing, such as strategies to incorporate dissent. Global governance ‘can be seen as a product of two phenomena: the pursuit of neoliberal forms of globalization, and the resistance to such centralization of power’ (Paterson et al. 2003: 2). From those perspectives, we can ask: In the case of GM crops, how does neoliberal globalization generate legitimacy problems and thus efforts to solve these through processes of governing? How do such efforts define collective-action problems?

GM CROPS AS CONTESTED SUSTAINABILITY

GM crops have intersected with a wider debate over how to remedy problems which result from intensive agricultural methods. Since the 1980s biotechnology companies have portrayed their GM crops as environmentally-friendly products. Exemplifying a neoliberal view, proponents emphasize that GM crops offer eco-efficiency benefits – by minimizing agrochemical usage, deploying resources more efficiently, increasing productivity, and so enhancing economic competitiveness. This scenario presumes a homogeneous agri-environment as an economic resource for industrial production.

Industry R&D programmes diagnose inefficient agricultural inputs as the problem, which can be solved by precise genetic changes in crops. These link economic competitiveness and environmental efficiency. From those perspectives, society faces the risk of foregoing the crucial benefits that biotechnology can bring. Such arguments exemplify wider links between economic globalization and technological determinism (Barben 1998: 417).

In contrast, critics’ arguments have exemplified community views, e.g. by defending the agri-environment as common resources and farmers’ skills in using them. They have argued that GM crops impose unknown ecological risks, reduce the biodiversity of plant cultivars, subordinate R&D to commercial criteria, generate selection pressure for resistant pests, and promote the further industrialization of agriculture (e.g. Haerlin 1990. They warn against a ‘genetic treadmill’, by analogy to the agrochemical treadmill – whereby pests develop resistance to pesticides, companies try to develop alternatives faster than the resistance, and farmers become more dependent upon chemical solutions. Moreover, some critics diagnose the problem as intensive monocultural practices which attract pests and disease, while eliminating plant and insect biodiversity which could otherwise help to protect crops.

By the late 1990s, partly in response to critics, the biotechnology industry recast sustainability in its own image of intensive monoculture. For example, inefficient inputs were cited to explain the problems of food insecurity and consequent environmental degradation in poor countries. As a remedy, GM crops would help to increase agricultural productivity, thus increasing production and/or decreasing land requirements and degradation. Other arguments have been more relevant to industrialized countries; GM crops

have been portrayed as complementary to Integrated Pest Management (IPM), or even as IPM in themselves (Levidow et al., 2002).

With the slogan, 'Creating value through sustainability', the Monsanto Company links market competition, use values, environmental protection and food security. According to its Report on Sustainable Development: 'The problem is often framed as a choice: either feed a rapidly growing population... or preserve natural habitats for biodiversity. But we can do both by continuing the progress of high-yield agriculture' (Monsanto 1997: 16). According to Monsanto, GM crops substitute intelligence for energy and materials: 'Our products create value for our customers by helping them to combine profitability with environmental stewardship. For product impact, this means: more productive agriculture, more soil conservation, less insecticide use, less energy, better habitat protection' (ibid). In particular, 'in-built genetic information' helps GM crops to protect themselves from pests and disease. Herbicide-tolerant crops facilitate no-till agriculture, which 'decreases soil erosion, nutrient and pesticide runoff, as compared to conventional tillage' (Magretta 1997).

According to Novartis, GM insecticidal maize 'contributes to sustainable agriculture through savings on mineral fertilisers, fossil fuels and pesticides' (Novartis 1998). Such arguments exemplify the company's general perspective on intensifying agriculture in more benign ways:

> Sustainable intensification of agriculture can be defined as follows: The use of practices and systems which maintain and enhance: a sufficient and affordable supply of high quality food and fibre, the economic viability and productivity of agriculture, the natural resource base of agriculture and its environment, and the ability of people and communities to provide for their well-being (Imhof 1998).

Here the term 'community' is appropriated as an agent of eco-efficient intensification.

Likewise, the term 'biodiversity' has been recast in the image of GM crops. Biotechnology bears 'the prospect of an artificially created biodiversity', in several ways; it seeks to 'smooth out' nature, as the means to attain a genetic-level control (Krimsky and Wrubel 1996). Thus, genetic modification changes the terms of reference for what counts as diversity, along neoliberal lines of marketizing nature. According to proponents, GM crops provide a greater variety of genetic combinations, which thereby increase biodiversity – redefined as laboratory simulations of natural properties.

CONFLICTS EMERGE OVER GM CROPS

In Europe 'sustainable agriculture' has been framed by distinct cultural values, linking the quality of food products, rural space and livelihoods. Although chemical-intensive methods prevail in Europe, the countryside there is increasingly regarded as an environmental issue, variously understood – e.g. as an aesthetic landscape, a wildlife habitat, local heritage, a stewardship role for farmers, and their economic independence. These values conflict with neoliberal models of agriculture as a contest for greater productivity and economic competitiveness.

In European national debates over GM crops, 'risk' discourses have been central, though often linked with 'sustainable agriculture'. Until the mid-1990s Europe had little such debate over GM crops, except in Germany and Denmark. Later, intense conflicts emerged in some other countries. Protest was driven mainly by activists from environmentalist and farmer groups; these catalyzed broader opposition networks, as well as scientists' networks which raised doubts about safety claims. This section surveys national features of the Europe-wide debate and protest, illustrating various concepts of sustainability. The subsequent section will analyse regulatory responses during the same period.

Protest Emerges

Since the 1980s German NGOs have largely opposed biotechnology. They highlighted its reductionist model which diagnoses social problems as genetic deficiencies. They criticized a 'technology-induced' approach, which simply evaluated risks and benefits of GM crops. NGOs counterposed a 'problem-induced' approach, which would compare such products to other potential weed-control methods, as alternative solutions to agricultural problems. But this proposal was marginalised (Gill 1993). NGOs also voiced their concerns in public hearings but were largely dismissed as irrational by officials (Gill 1996).

Germany's policy has been driven by a neoliberal framing of biotechnology as a *Hoffnungsträger* (hope-carrier) – that is, an essential tool for R&D investment, innovation, a stable job market and international competitiveness. Protesters have emphasized that GM crops threaten 'nature' – popularly associated with forests in Germany, though linked little to agriculture. Such polarization continued through the 1990s (Dreyer and Gill 2000). Neoliberal policy assumptions were finally opened up for debate in 2001, when the Red-Green coalition government initiated the *Diskurs grüne gentechnik*, high-profile public discussions about how agbiotech may relate to sustainable agriculture.

Also since the mid-1980s, in Denmark many NGOs questioned whether GM herbicide-tolerant crops would be a step towards sustainable agriculture. They obtained funds to organize an educational campaign to stimulate a national debate, linked with a Consensus Conference on agricultural biotechnology. Trade unions generated further debate on advantages and disadvantages. They distributed material which posed questions about sustainable agriculture: for example, would GM crops alleviate or aggravate the existing problems of crop monocultures? (Elert 1991: 12). In response to that early debate, Denmark's 1986 biotechnology law nearly banned the environmental releases of GMOs, while affirming the general aim of 'sustainable development', like all environmental legislation in that period.

Since the 1980s Denmark has had a policy to reduce agrochemical usage, especially so that ground water can be used safely as drinking water. Citing that policy aim, NGOs have demanded risk assessments which evaluate the long-term implications of GM crops for herbicide usage and residues. They successfully pressed the Danish Parliament to raise such questions about herbicide-tolerant crops. In response, the Environment Ministry adopted broad risk-assessment criteria along those lines (Toft 2000). The Danish approach valued groundwater as a common resource, implicitly linked with more extensive cultivation methods which use fewer pesticides. Thus environmental management somewhat accommodated a community-type view of public goods.

In Europe GM crops reached the commercial stage amid a wider debate over the future of agriculture. The 1996 'mad cow' crisis undermined the credibility of safety claims for food products. It also aggravated a prior suspicion towards 'factory farming'. This phrase originally denoted agribusiness production-line approaches to animal husbandry, including the caging and 'feedlotting' of animals; it was later extended to intensive methods in general, even for crops.

Anti-biotechnology activists throughout Europe catalysed a wide-ranging risk debate about the intensive methods prevalent in the agro-food chain. Environmental NGOs emphasized unpredictable risks as grounds for a moratorium on commercial use of GM crops (e.g. FoEE 1996-98). Environmental issues were taken up also by consumer NGOs. Protest linked GM food with environmental risks of cultivating GM crops. Many people boycotted GM food as a way to 'vote' against agricultural biotechnology, in lieu of a clear democratic procedure

for a societal decision about a contentious technology. By the late 1990s, in response to consumer and environmentalist protest, most major European retail chains had excluded GM ingredients from their own-brand products (Levidow and Bijman 2002).

By the late 1990s GM crops were being debated for whether their associated agricultural methods complement or contradict 'sustainable agriculture' – a term that now had diverse meanings (for example, eco-efficiency, Integrated Crop Management, organic farming, and peasant autonomy). Eco-efficiency arguments were often cited to promote GM crops.

Such benefits were proclaimed at a time when commercial use had hardly begun in Europe. According to an EU committee, biotechnological solutions are 'guaranteeing yields, helping to cut the use of plant health products in combating pests and diseases, and creating quality products'. Such efficiency extends even to regulatory science: thanks to its precise techniques, genetic engineering 'allows more accurately targeted risk prediction', argued the committee (EcoSoc 1998).

National Debates Over Agbiotech

From an eco-efficiency standpoint, expert evaluation could readily endorse GM crops. In Spain, which had little protest, its national advisory committee implicitly considered their benefits for environmental sustainability. Benefits were defined as any improvement over present practices – for example, the potential for herbicide-tolerant crops to reduce herbicide usage, and likewise for Bt insecticidal crops to reduce insecticide usage (Todt and Lujan 2000). In other countries, however, the evaluation was more stringent or negative.

In Austria GM crops symbolized a threat to organic agriculture and thus to national values. Even before GM crops became an issue there, the Austrian government was promoting organic farming – as ecologically sound, as 'quality' products, and as an economically feasible market-niche alternative for an endangered national agriculture. This anti-biotech scenario of 'competitiveness' contrasted with the pro-biotech imperative to increase agricultural productivity. Some officials regarded agricultural biotechnology as a threat to the environment and an obstacle to sustainability. Austrian regulators unfavourably compared potential environmental effects of GM crops to methods which use no agrochemicals (Torgerson and Seifert 2000). Austria is among several countries or regions which have promoted 'GMO-free zones' as a means to protect the heritage and biodiversity of European agriculture (cited in FoEE 2000).

In the UK anti-agbiotech critics drew an analogy between GM crops, industrialized agriculture and the market pressures which led to the BSE crisis. Critics warned that broad-spectrum herbicides, for which herbicide-tolerant GM crops are designed, could harm wildlife habitats near agricultural fields. On these grounds, the government's own nature conservation advisors had demanded a delay in commercial use. The Consumers Association attacked the agro-food industry for its 'unshakeable belief in whizz-bang techniques to conjure up the impossible — food that is safe and nutritious but also cheap enough to beat the global competition' (McKechnie 1999).

UK farmers were divided or ambivalent. The National Farmers' Union initially supported GM crops as an important tool for economic competitiveness, but later it became more cautious. Early dissent came from a split-off called the Small and Family Farm Association. In 1998 the Soil Association declared that crops must have no GM 'contamination' in order to be certified as organic, and this became an EU-wide standard.

In opposing GM crops, some critics counterposed less intensive methods – as a future alternative scenario, and as a baseline for judging the environmental effects of GM crops. According to UK environmental consultants, for example, these products became a focus of public pressure because they are designed for an 'increasingly intensive monoculture'. Therefore, GM crops should be evaluated in a wider debate about sustainable agriculture, 'not just relative to today's substantially less-than-sustainable norm' (Everard and Ray 1999: 6).

In France in the mid-1990s, anti-GM activists catalysed a national debate. They launched a scientists' petition, which emphasized unknown risks and advocated a moratorium on GM crops; many prominent scientists signed the petition. Some critics focused on GM herbicide-tolerant oilseed rape, which could readily generate herbicide-tolerant weeds and thus complicate the use of herbicides. Innovation research on such products was abandoned by the Institut National de la Recherche Agronomique (INRA).

In the late 1990s the French debate soon expanded from 'risk' to sustainability issues. Some industrial-type farmers initially sought access to GM crops, as a means to enhance their economic competitiveness. Others, affiliated to the Coordination Paysanne Européenne, regarded such products as a threat to their skills and livelihoods. According to French peasants' leaders, GM crops pose risks to their economic independence, to high-quality French products, to consumer choice and even to democracy. This vision resonated with the trend towards producing French food as *produits de terroir*, a label which denotes its origin from specific localities and peasant cultivators.

When peasant activists were prosecuted for sabotaging stores of GM grain, they used the trial to gain public support for their attack on industrialized agriculture. As an alternative future, they argued, 'Today, more and more farmers lay claim to a farmer's agriculture, which is more autonomous, economic, and which integrates problems associated with the environment, employment, and regional planning' (Bové 1998). Against the commoditized inputs of multinational companies, they counterposed their own *paysan savoir-faire* (Heller 2002).

As in France, Italian anti-GM critics sought to protect the agro-food chain as an environment for specialty products. The Italian Parliament had already allocated subsidies to promote local crop varieties, *prodotti tipici*, and now foresaw these being displaced by GM crops. According to a Parliamentary report, the government must 'prevent Italian agriculture from becoming dependent on multinational companies due to the introduction of genetically manipulated seeds'. Moreover, when local administrations apply EU legislation on sustainable agriculture, they should link these criteria with a requirement to use only non-GM materials (Camera dei Deputati 1997, as cited in Terragni and Recchia, 1999).

In the Italian Parliament and government, anti-biotechnology arguments were led by members of the Green Party, which headed the Environment Ministry after the Olive Tree Coalition won the 1997 election. These bodies adopted arguments from Coltivatori Diretti, a million-strong union of mainly small-scale farmers. Its members regarded GM crops as threats to local specialty food products and to crop biodiversity (Terragni and Recchia 1999).

Thus divergent cultural understandings underlay the controversy over GM crops. In various ways around Europe, claims for environmental safety or benefits rested on an eco-efficiency account of sustainability – for example, reductions in pesticide usage. This conflicted with other accounts, emphasising farmer independence, producer-consumer relationships, land-use patterns, and so forth.

Alternatives stimulated

As an alternative to industrialized methods, agricultural extensification originated in concepts of ‘harmonious control’, later ‘integrated control’, and eventually ‘Integrated Pest Management’ (IPM). Along with a shift towards biological crop-protection agents, this also meant changes in agronomic practices and farm structure. All these changes draw upon and stimulate research into ‘agro-ecology’, especially in Europe (e.g. Greens/EFA 2001).

Public protest has given further stimulus to such alternative methods. Food retail chains require and help farmers to adopt cultivation methods which avoid pest problems and so reduce the need for agrochemicals. They promote IPM, which enhances knowledge of how best to use various methods and inputs (EUREP 1999).

Through some IPM methods, farmers could gain independence from purchased inputs from suppliers. Such efforts diverge from intensive agricultural models. Retail chains fund research on soil-management methods which strengthen plant resistance to pests and disease. Organic food lines are expanded by supermarket chains; organic breeding institutes develop pest-tolerant seeds which may be more durable in the face of novel pests (Levidow and Bijman 2002).

The agro-food industry has undergone pressure to change not only the characteristics of products, but also the concept of innovation. Beyond product-based solutions, different cultivation processes are developed. By 2001 some governments were giving more financial support for research on such alternatives. Consequently, future scenarios for European agriculture are not limited to conventional versus GM inputs. Both options are challenged by a debate over what kind of agriculture and society is wanted. As environmentally less harmful methods are developed for crop-protection, these alternatives serve as more stringent comparators than the chemical-intensive methods which underlay early safety claims for GM crops.

REGULATORY PROCEDURES AS CONFLICT MEDIATION

The EU had approved some GM crops for commercial cultivation in the mid-1990s, when safety claims rested on a neoliberal view of sustainability. In the late 1990s public protest led member states and the EU overall to re-open the original basis. Mediating the conflict, regulatory procedures moved towards more stringent criteria, which potentially favoured comparisons to less-intensive cultivation methods (for detailed references, see Levidow and Carr 2000).

Safety approval disputed

For regulating GMOs, EC legislation sought to link environmental protection with market integration by overcoming internal trade barriers. As rationales for Community-wide legislation, proponents cited the prospect that diverse national rules could impede the internal market or that GMOs could cross national boundaries. To address those problems, the Deliberate Release Directive aimed to ‘establish harmonized procedures and criteria’ for assessing GMO releases, so that any product approval would apply throughout the European Community. Member states had a duty to ensure that GMOs did not cause ‘adverse effects to human health or the environment’ (EEC 1990: 15). However, the practical definition of ‘adverse effects’ later proved to be contentious and thus difficult for achieving harmonized criteria.

In the mid-1990s the EU regulatory procedure came under political pressure to approve GM products. Industry-wide lobby groups warned government that companies would shift R&D investment to North America if product approvals were unduly delayed. The EC Directive itself came under attack for stigmatizing GMOs, thus disadvantaging 'European' biotechnology and its competitiveness.

At European and national levels, governments promoted biotechnology on several grounds. According to officials, such technological development would attract R&D investment, enhance the efficiency of European agriculture, and reduce the environmental impacts of agriculture. Economic arguments came specially from the UK and German governments. Politicians warned against the potential loss of economic and environmental benefits from GM crops. 'Completing the internal market' was sometimes linked with 'free trade' agendas and proposals to liberalize European agriculture.

Within that neoliberal policy framework in the mid-1990s, many national regulators accepted safety claims by companies, while acknowledging that GM crops could cause some undesirable effects. If weeds acquired tolerance to herbicides, or if insects acquired resistance to GM toxins, then such inadvertent effects would undermine the efficacy of the corresponding control agent. These 'genetic treadmill' scenarios were conveniently classified as 'agricultural problems' rather than as environmental harm; moreover, other pest-control methods would still be available. Current options were regarded as interchangeable and therefore dispensible, regardless of whether they might be deemed environmentally preferable.

By defining harm in narrow ways, safety claims could treat the European agri-environment as a homogeneous resource for intensive monoculture, by analogy to the US model. GM crops were judged to cause no more harm than the most agrochemical-intensive cultivation methods. And there was no government responsibility for evaluating the effects of changed herbicide practices, for example, a switch from selective to broad-spectrum herbicides. On that basis, EU-wide approval was granted to a GM herbicide-tolerant oilseed rape and insect-protected maize in 1996-97. Dissent came from several EU member states – particularly Denmark, Austria and Sweden. They demanded that the risk assessment should consider a broader range of plausible effects. Some countries also emphasized the overall environmental implications of spraying broad-spectrum herbicides on the crop.

Responses to national protest

After the first shipments of GM soya reached Europe in late 1996, public protest erupted against GM crops, especially in the UK and France. protestors associated agbiotech with an ominous 'globalization', including greater control by multinational companies. Pressures to industrialize agriculture were associated with the 1996 'mad cow' crisis. Earlier safety assumptions were challenged, and national objections gained strength. In 1998 the EU Environment Council decided that henceforth risk assessments must include any 'indirect effects' of changes in agricultural management. This accommodated UK demands to evaluate effects of herbicide-usage patterns on farmland biodiversity.

Also the prospect of a genetic treadmill, formerly marginalized as an 'agricultural problem', was now treated as a risk to be managed and prevented. This policy was implicit in the 1998 EU approval of an insecticidal crop, and was explicit in decisions by France and Spain to require monitoring. In such ways, governments and industry devised further controls on GM crops. These included measures to limit the spread of herbicide-tolerance genes, to limit insect resistance, and to monitor herbicide-tolerant crops for potential harm from broad-spectrum herbicides.

The UK funded measures for testing the overall effects of herbicide usage on biodiversity near fields. 'Farm-scale evaluations' were designed to simulate the practices of commercial farmers, to compare GM herbicide-tolerant crops with previous practices, and so to gain more evidence about broad-spectrum herbicides. Representing views of various environmental groups, nature-conservancy agencies were incorporated into the scientific steering committee. These agencies proposed that the experimental design should include non-GM fields which use relatively less-intensive farming methods, to provide a more stringent baseline for evaluating the effects of spraying GM crops. The ultimate design incorporated their proposal.

Broader bodies were established to discuss regulatory criteria as policy issues. The UK established an Agriculture and Environment Biotechnology Commission to provide advice on strategic issues, such as definitions of environmental harm and criteria for sustainable agriculture. Likewise France established a new body to advise the Environment Ministry on general issues, as well as a *biovigilance* committee to evaluate the methods for environmental monitoring of GM crops. Also in France the Parliament organized a high-profile citizens conference. The lay panel proposed more stringent regulation and more public funds for agbiotech R&D, as if the latter were benign (Marris 1999). This procedure served to reinforce state-based expertise for managing risks of GM crops and for promoting their innovation. The Environment Ministry took a greater role in risk regulation; the advisory committee was expanded to include more public-interest representatives and critics of safety claims (Roy and Joly 2000)

By the late 1990s numerous GM crops were awaiting an EU-wide decision on commercial approval. Some government officials criticized such delays as a threat to 'globalization', while protestors reversed the argument: globalization threatened national sovereignty and democracy. At the June 1999 meeting of the EU Environment Council, many member states declared that they would not consider requests to authorize additional products until new conditions were fulfilled: 'Given the need to restore public and market confidence', among other reasons, the EU must first adopt measures to ensure full traceability and labelling of GM crops across the agro-food chain; risk-assessment procedures must be more transparent and be based on precaution. The EU-wide decision procedure was effectively suspended through a *de facto* moratorium.

The moratorium increased pressures upon the Commission to devise stronger legislation. Eventually the Deliberate Release Directive was revised to include more stringent measures which some member states had already been developing. It provided for time-limited registrations, required market-stage monitoring, and clarified that the risk assessment must consider the effects of any changes in agricultural management methods, such as changes in herbicide usage (EC 2001). Taken together, all these measures incorporated flexible agri-environmental norms, including potential harm to farmland biodiversity from farmer practices. Such reforms potentially enhance public accountability for regulatory judgements – that is what types of effects should be prevented, what counts as adequate evidence, and thus whether products should be approved. Some national stances were already influenced by wider stakeholder involvement, though such influence was largely limited to regulation.

Diagnoses of legitimacy crisis

Agricultural companies had initially played a central role in setting policy agendas, but protest and commercial blockages against agbiotech opened up the policy process to a wider web of stakeholders. Industry had difficulty in responding to the new context (Levidow et

al., 2002). The regulatory impasse stimulated policy discussions about 'the public' as a problem.

Many government officials and advisors diagnosed the problem as 'public distrust'. This in turn was attributed to various deficiencies – of public rationality, of public knowledge, or risk communication, of government procedures, or all those (Levidow and Marris 2001). The need to gain or restore trust served as a general rationale to make institutions more trustworthy, through measures which official experts did not always regard as scientifically grounded.

Beyond simply educating the public, proposed remedies included greater public transparency, consultation and even participation, sometimes in the name of 'governance'. Given the credibility problems of 'science-based regulation', 'Science and Governance' was given special prominence as a policy problem, within a broader agenda to overcome the EU's democratic deficit. As these discussions recognized, official expertise was often contested and so could not simply legitimize policy decisions. As a way forward, there were proposals to democratize expertise. According to an official report by that title, official experts and 'counter-experts' often contradict and challenge one another.

> While being increasingly relied upon, however, expertise is also increasingly contested…. 'Traditional' science is confronted with the ethical, environmental, health, economic and social implications of its technological applications. Scientific expertise must therefore interact and at times conflict with other types of expertise… (Liberatore 2001: 6).

At a conference on 'Science and Governance', discussion focused largely on risk assessment rather than R&D policy. Nevertheless critical perspectives emerged specially in a workshop on 'Anticipating Risks'. According to the rapporteur:

> The need to involve normative considerations in dealing with precautionary-oriented scientific issues is also an element that has a transforming capacity. Many of these issues call for various forms of participatory processes within which stakeholder involvement is important both for the formulation of concepts and questions as well as for the implementation... The broadening of what is really meant by a technology product, including the shift into providing services, changes the character of innovation characteristics (DG-JRC and Research 2000: 3)

In that vein, agbiotech became a focus of a debate on normative issues, eg. over how products structure human practices, environmental effects, land use, and so forth. However, prevalent policy language selectively referred to GM techniques and products as 'the technology', as if more extensive cultivation methods were not a significant innovation.

CONCLUSIONS: GOVERNING EUROPEAN CONFLICTS OVER GM CROPS

As shown in this case study, conflicts over GM crops express divergent views of sustainability, which can be analysed through a tripartite taxonomy (see Table 2, by comparison to Table 1). In this taxonomy, each view diagnoses problems so as to favour its own concept of what to sustain – for example, different forms of the economy, environment, and society. Each also has different priorities for expertise. Each view may recast key terms, such as Integrated Crop Management, biodiversity, eco-efficiency, and community.

Table 2: Divergent Views of GM Crops vis à vis Sustainable Agriculture

View > Issues	**Neoliberal view: high-yield intensification**	**Environmental mgt view: precautionary regulation**	**Community view: extensification**

Global problem	genetic deficiencies of crops; inefficient inputs which limit farm productivity	transboundary risks of GM crops; regulatory differences across countries	intensive monoculture; farmer dependence on multinational companies
Concepts of nature	laboratory simulations of biodiversity to protect crops	delicate balance; 'environment' mainly beyond agriculture	biodiversity of cultivars and biocontrol agents
Economic Aims	compete for & gain sales of 'green' commodities	avoid trade barriers through common envtl standards	link producers-consumers through quality production
Solution	eco-efficiency replaces energy & materials with genetic info	precautionary measures; biodiversity conservation	less-intensive methods of cultivation
Expertise	develop GM crops which reduce agrochemical usage	compare bio-physical effects of GM/non-GM crops in advance	develop farmers' knowledge of biodiversity & local resources

The term 'sustainability' has been appropriated by political forces supporting and opposing agbiotech. From a neoliberal view, GM crops offer as eco-efficient solutions to the supposed problem of inefficient agri-inputs, thus potentially intensifying market competition for agri-food products. From a community view opposing GM crops, more extensive crop-protection methods would protect agro-environmental resources as a common good, while 'quality' production would directly link producers with consumers. Such alternatives were counterposed as benign alternatives and as more stringent comparators for evaluating GM crops.

As a form of environmental management, regulatory procedures have mediated between neoliberal and community-type views of sustainability, in ways which changed in response to protest. Early on, EU procedures linked environmental protection with a regulatory harmonization which would help to liberalize trade, especially within the EU's internal market. This favoured neoliberal models of the agri-environment as a homogeneous resource for greater productivity. In the late 1990s, protest associated agbiotech with an ominous 'globalization' which would undermine democracy, industrialize agriculture and subordinate farmers to multinational companies.

In response to protest and legitimacy crisis, the EU's technocratic harmonization model gave way to diverse national frameworks for valuing the agri-environment. Risk assessment was extended to protect common goods such as pest-control agents, farmland biodiversity and groundwater. As a form of environmental management, regulatory procedures accommodated proposals to evaluate and manage a broader range of plausible undesirable effects from GM crops. Rather than standardise an intensive-agricultural model, regulatory procedures could circulate more diverse and stringent criteria across EU member states.

Those changes also involved processes of governing, expressing the need to 'restore public and market confidence' as a collective action-problem. Partly with that rationale, official experts acknowledged more scientific uncertainties and potential effects that may warrant regulatory controls. New procedures involved various groups sceptical of agbiotech. Some national procedures broadened their expert advisory bodies, sought means to involve stakeholder groups and established more consultation procedures. For example, the French Parliament organized a citizens conference, whose lay panel proposed more stringent risk regulation and more public funds for agbiotech R&D. The expert advisory group was expanded to include critical voices. In the UK, environmental groups influenced the design of large-scale experiments testing effects on farmland biodiversity. An additional advisory body was created there with a broad remit to deliberate criteria for environmental harm and sustainable agriculture.

This basis for governing had a relatively greater scope to accommodate dissent and so mediate the conflict, though within limits. Given the EU's treaty obligations, its regulatory procedures could incorporate diverse agri-environmental values only by technicizing them – for example, by devising means to measure biophysical effects of a specific GM product. This task often has methodological difficulties, which generate further disagreements over evidence. Moreover, EU authorities can still limit the definition of harm in practice, so that GM products may still gain approval on a narrow basis.

Another limitation arises from divergent models of agri-societal futures and technological progress. EU innovation policy is still largely driven by an imperative for 'economic competitiveness', generally meaning productive efficiency of intensive monoculture – criteria often in conflict with environmental and product quality. Unless R&D policies are opened up for debate and change, risk regulation will continue to bear the burden of conflicts around divergent sustainability models, without a capacity to promote alternative innovations. Within those limits, processes of governing can only incorporate or marginalize agbiotech critics, who in turn may continue their efforts to undermine public confidence in regulatory procedures.

Concepts for Policy and Analysis

Finally, this chapter illuminates implicit or contentious meanings of key policy concepts. These are also analytical concepts, though the two usages are often conflated, e.g. when social-science analysis takes for granted specific policy meanings. This case study highlights ambiguities which warrant analytical rigour.

'Globalization' was initially invoked as a dual imperative – of economic competitiveness and treaty obligations – which required approval of GM products. In response, critics identified globalization as a threat – as an imperative to resist undemocratic pressures, to defend sovereignty, and to create alternatives. As many NGOs proclaimed, 'Another agriculture is possible'. Thus globalization can be analysed as an ideological construct which reifies policy agendas as external imperatives or threats.

'Sustainable agriculture' too is generally invoked as if it had an obvious meaning. Yet the term is used to promote divergent models of development, while attempting to incorporate or marginalize rival models. These meanings can be analysed to identify contending agri-environmental futures at stake in innovation choices and in regulatory criteria.

'Governance' depends upon a collective action-problem which can provide a basis for joint activity by policy actors otherwise in conflict. Governance can displace antagonistic social views onto the arena of risk regulation and public trust, thus providing more subtle ways to legitimize regulatory procedures as trustworthy, or even to legitimise a contentious innovation as progress. Alternatively, it can mean opening up assumptions about the societal problem to be solved by innovation, thus going beyond regulatory conflicts. Thus, whether explicit or implicit, governance can be analysed as an effort to construct and solve a specific problem *as if* it were a collective one.

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